

Thermochromics with Very Low Transition Temperature, Phase I

Completed Technology Project (2018 - 2019)



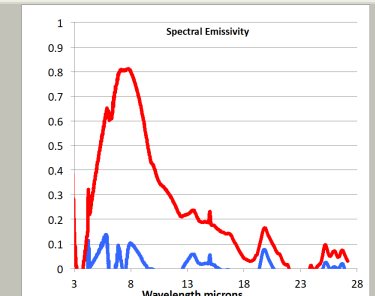
Project Introduction

Triton Systems is developing an unpowered, self-switching variable thermal radiance technology we call the Phase Change Thermochromic Radiator (PCTR) for active temperature control of spacecraft surfaces. PCTR automatically changes from low to high infrared emissivity above a designed temperature setpoint, causing a surface in space to radiate heat only when it exceeds a critical temperature. The principle of operation involves a phase change compound integrated into a thin film multilayer less than 2 μm thick. Whereas previous demonstrations of PCTR have shown transition temperatures only down to 30°C, the proposed program will reach temperatures of -10°C and possibly as low as -25°C. The new generation of PCTR will be capable of meeting the demands of manned space vehicles, planetary probes and landers, including manufacturability in areas of 10's of square meters

Anticipated Benefits

Subject technology applies to the 2015 NASA Technology Roadmap, TA14, which call for thermal systems with reduced mass, reduced power requirements, enhanced performance, and increased reliability and survivability in hostile environments. Area 14.2 relates to Thermal Control Systems able to maintain vehicle surfaces and internals within an appropriate temperature range, and Sub-area 14.2 describes mid-temperature (-150 to 500°C) Heat Rejection and Storage.

Defense applications of emittance control films will include satellites, thermal signature for ships, aircraft, UAVs and land vehicles. Commercial applications will be for thermophotovoltaics, or architectural energy control for roofs, windows and walls.



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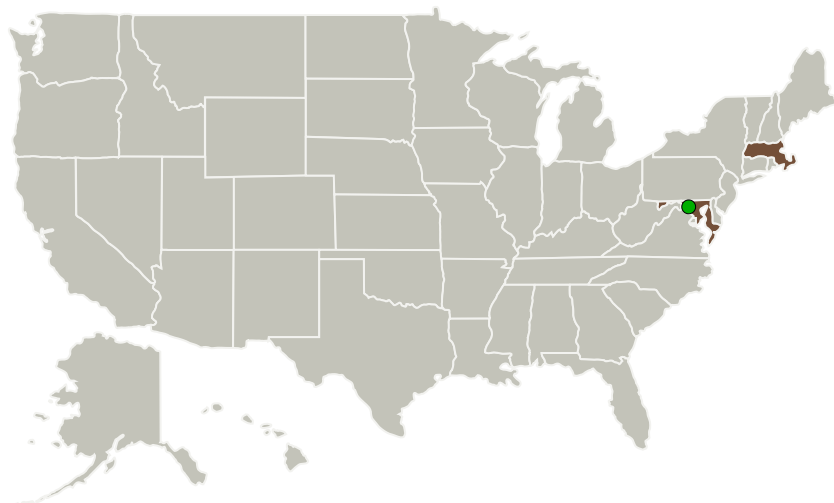
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Triton Systems Inc.	Lead Organization	Industry	Chelmsford, Massachusetts
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations

Maryland	Massachusetts
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Project Transitions

▶ **July 2018:** Project Start

✓ **February 2019:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139385>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Triton Systems Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

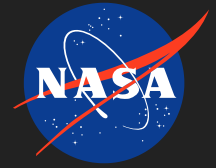
Larry Domash

Co-Investigator:

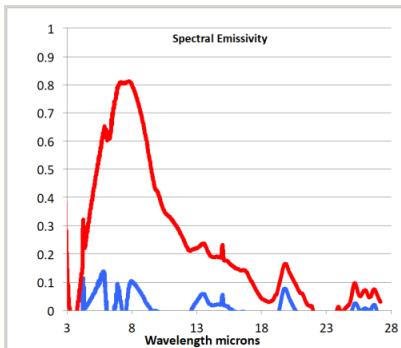
Lawrence Domash

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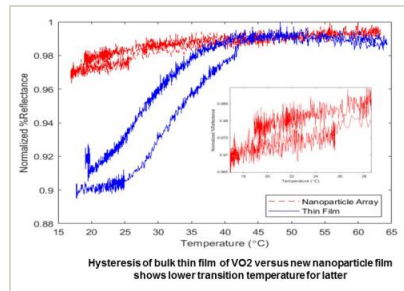


Images



Briefing Chart Image

Thermochromics with Very Low Transition Temperature, Phase I
(<https://techport.nasa.gov/image/134807>)

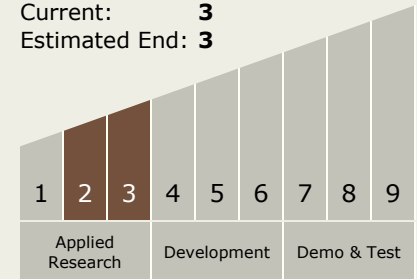


Final Summary Chart Image

Thermochromics with Very Low Transition Temperature, Phase I
(<https://techport.nasa.gov/image/125859>)

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.2 Thermal Control Components and Systems
 - └ TX14.2.3 Heat Rejection and Storage

Target Destinations

Mars, Earth, Others Inside the Solar System